

PATENT

CONTAINER AND SEALING COVER

RELATED APPLICATION

This application is a continuation of application serial no. 10/204,684 filed August 23, 2002 entitled CONTAINER AND SEALING COVER which claims priority based on common subject matter in PCT/US01/41317 filed July 10, 2001 and PCT/US01/02434, filed January 25, 2001, entitled CONTAINER AND SEALING COVER.

FIELD OF THE INVENTION

This invention relates generally to a container for storing foods, liquids and other articles and a replaceable cover or lid capable of providing a tight seal and more particularly to the container cover which is suitable for use in microwave cooking and in automatic dish washers.

BACKGROUND ART AND OBJECTS OF THE INVENTION

Food storage containers are generally made of a plastic material such as polypropylene or polyethylene polymers or copolymers. Such containers are normally fairly rigid, but may be subject to some amount of flexure especially where the lid or cover is arranged to be peeled off of the container mouth. Most such container/lid configurations provide a sealing bead or rim along the upper wall of the container with a mating channel on the lid which engages the bead as well as the adjacent inner and outer surfaces of the container wall. Such sealing arrangements generally require considerable effort to force the lid onto the sealing bead during the closing procedure and perhaps greater effort to peel the lid away from the container during the opening process. While some lids are provided with one or more outwardly extending tabs to accommodate a user's fingers, the opening procedure may be quite difficult for a person suffering from arthritis or tendinitis. In addition, the lids of such sealable containers often become distorted through heating, dishwashing or refrigeration procedures making lid replacement difficult or impossible. In addition containers

1 designed for microwave use are generally provided with a separate vent located in the lid for
2 preventing pressure build up.

3 In some designs a separate sealing member such as an O-ring or annular gasket is disposed
4 between the container rim and the lid channel to provide a more secure seal. Such designs may rely
5 on frictional forces to maintain the lid in place on the container or may rely on latching arms carried
6 by the lids which engage retention lips on the container. In either case the separate sealing member,
7 i.e., O-ring or gasket involves not only added manufacturing costs, but is subject to being misplaced
8 or lost during use of the container.

9 There is a need for a more user friendly food storage container/cover which overcomes the
10 above shortcomings.

11 SUMMARY OF THE INVENTION

12 A container in accordance with the present invention includes a bottom wall and an
13 upstanding peripheral wall terminating in an upper edge surrounding an open top or mouth. At least
14 an upper portion of the wall defines an inside sealing surface which circumscribes the wall below
15 the peripheral edge. While the container is preferably rectangularly-shaped, it may also be circular
16 or oval in shape.

17 A replaceable cover is provided which includes a top, preferably dish-shaped, with a planar
18 top wall terminating in a downwardly extending outer rim flange or skirt. The skirt is arranged to
19 fit over a substantial portion of the upper edge of the container. The cover includes a downwardly
20 extending inner sealing flange circumscribing the cover inwardly of the outer flange. The sealing
21 flange has a lower section terminating in a free edge, the perimeter of which is greater than the
22 perimeter of the container sealing surface so that the lower section of the sealing flange forms an
23 interference fit with the inside sealing surface of the container wall when the cover is pressed
24 downwardly over the mouth or open top of the container.

25 A pair of latch handles are pivotally mounted on opposite sides of the cover along the outer
26 rim flange thereof with each latch handle being provided with a protruding locking tab arranged to
27 snap under a section of the peripheral upper edge of the container wall when the latch handle is
28 rotated downwardly to lock the cover in a sealing relationship over the container mouth. The outer
29 rim skirt of the cover does not extend under the peripheral upper edge of the cover so that the cover

1 can be readily removed when the latch handles are rotated upwardly to disengage the locking tabs
2 from the peripheral upper edge of the container. Also when one of the latch handles is rotated to its
3 unlocked position expanded fluid within the container will cause the lid (or a portion thereof) to rise
4 slightly during microwave cooking to provide the necessary venting action to prevent excess pressure
5 build-up.

6 In one embodiment the upper portion of the container peripheral wall is inclined outwardly
7 at a slight angle to the vertical, say 2° to 5° and the sealing flange is substantially vertical.

8 In an alternative embodiment the upper portion of the container wall and the inside sealing
9 surface defined thereby is substantially vertically disposed and the sealing flange is outwardly canted,
10 when the bottom wall is positioned on a horizontal plane. The sealing flange seats against the inside
11 sealing surface of the container wall when the cover is pressed downwardly over the mouth or open
12 top of the container to form the interference fit. As an additional feature, to facilitate mating and un-
13 mating the container and cover, the uppermost portion of the wall defines a transition or lead in
14 surface for guiding the sealing flange into registry with the container sealing surface. Such transition
15 surface may be inclined outwardly at an angle to the vertical, e.g., 45° or less, when the bottom wall
16 is positioned in a horizontal plane.

17 The construction and function of preferred embodiments of the container/cover arrangement
18 of the present invention may best be understood by reference to the following description taken in
19 conjunction with the accompanying drawings in which like components are designated by the same
20 reference numeral in the several figures.

21 BRIEF DESCRIPTION OF THE DRAWINGS

22 Fig. 1 is a perspective top view of a container and cover in accordance with the present
23 invention showing the cover in a separated condition with the latch handles unassembled;

24 Fig. 2 is a perspective bottom view of the container/cover of Fig. 1 showing the bottom of
25 the cover and container in some detail;

26 Fig. 2a is an enlarged partial cross-sectional view of the cover of Fig. 2 taken along lines 2a-
27 2a showing the disposition of the ribs;

28 Fig. 3 is a top plan view of the container;

1 Fig. 4 is a cross-sectional view of the container taken along lines 4-4 of Fig. 3 showing the
2 angle that the upper portion of the container side wall makes with the vertical;

3 Fig. 5 is a bottom plan view of the cover;

4 Fig. 6 is a side elevational view of the cover;

5 Fig. 7 is a cross-sectional view of the cover taken along lines 7-7 of Fig. 5;

6 Fig. 8 is a top plan view of one of the latch handles;

7 Fig. 9 is a bottom plan view of a latch handle;

8 Fig. 10 is a side elevational view of a latch handle;

9 Fig. 11 is a bottom plan view of the container and cover in an assembled and locked position;

10 Fig. 12 is a top perspective view of the container and cover with one of the latch handles
11 rotated to its fully upright position illustrating the simultaneous application of upward pressure to
12 the latch handle and downward pressure to the cover for breaking the seal and releasing the cover
13 from the container;

14 Fig. 13 is a side elevational view of the container and cover in an assembled and locked
15 position; and

16 Fig. 13a is a enlarged sectional view of the right medial end of the assembled container and
17 cover showing (a) the interference fit between the cover sealing flange and the inside surface of the
18 upper portion of the container side wall and (b) the configuration of the end section of the cover
19 overlying the container handle;

20 Fig 14 is a perspective view of another container and cover in accordance with the present
21 invention showing the cover in separated condition with the latch handles unassembled

22 Fig. 15 is a perspective bottom view of the container/cover of Fig. 14 showing the bottom
23 of the cover and container;

24 Fig. 16 is a top plan view of the container of Fig. 14;

25 Fig. 17 is a cross-sectional view of the container taken along lines 17-17 of Fig. 16;

26 Fig. 17a an enlarged sectional view of the right medial end of the container showing the
27 upper portion of the container;

28 Fig. 18 is a bottom plan view of the cover;

29 Fig. 19 is a side elevational view of the cover;

1 Fig. 20 is a partial cross-sectional view of the cover;
2 Fig. 21 is a top plan view of one of the latch handles;
3 Fig. 22 is a bottom plan view of a latch handle;
4 Fig. 23 is a side elevational view of a latch handle;
5 Fig. 24 is a side elevational view of the container and cover in an assembled and locked
6 position;

7 Fig. 24a is an enlarged sectional view of the left medial end of the assembled container and
8 cover showing (a) the sealing fit between the cover sealing fin and the inside surface of the upper
9 portion of the container side wall and (b) the configuration of the end section of the cover overlying
10 the container handle;

11 Fig. 25 is an enlarged sectional view of the left medial end of the assembled container and
12 cover showing the cover sealing flange and the inside surface of the uppermost portion of the
13 container side wall prior to flexure;

14 Fig. 26 is an enlarged sectional view of the latch handle in its open position;

15 Fig. 27 is an enlarged sectional view of the latch handle rotated in its closed position;

16 Fig. 28 is a bottom plan view of the container and cover in an assembled and locked position.

17 DESCRIPTION OF THE PREFERRED EMBODIMENT

18 Referring now to Figs. 1-4, the container 10 of the present invention includes a flat bottom
19 wall 12 which merges at its periphery, via a rounded corner 14, with a peripheral wall, comprising
20 end walls 16 and side walls 18. As discussed previously, while the container shown in the drawings
21 has a rectangular shape, the container of the present invention may have a circular or oval shape with
22 only a peripheral upstanding wall. The end and side walls of the container 10 are merged, via
23 rounded corners 20, as shown. The peripheral wall (16, 18) terminates in an upper edge 22, via an
24 outwardly extending convex shaped segment 24. The edge 22 surrounds and defines an open top
25 or mouth 25 of the container 10 and forms a pair of horizontally protruding handles 26 above the
26 end walls 16 as shown. The top surface of the handles are substantially level with the plane of the
27 edge 22 simplifying the manufacturing process and allowing the cover to overlies the handles as
28 illustrated for example in Fig. 12 to be described. The bottom wall 12 of the container projects
29 downwardly at the corners forming triangular shaped protruding feet 28.

1 The peripheral wall (16,18) has a slight convex surface, preferably formed along a radius R
2 of about 75 inches, so that an upper section 30 of the peripheral wall (extending below the curved
3 segment 24) is disposed at about an angle θ of 2° to 5° and preferably about 3° to the vertical with
4 the bottom 12 lying in a horizontal plane as is illustrated in Fig. 4. This slight angle facilitates the
5 entry of a peripheral sealing flange or fin 44 on the cover, to enter the mouth of the container and
6 form an interference or sealing fit with an inner sealing surface 30b formed on a lower portion of the
7 wall section 30 when a cover 32 is seated onto the container, as will be explained in more detail. See
8 Figs. 4 and 13a.

9 Referring now to Figs. 1, 2 and 5-8, a replaceable cover or lid 32 for use with the container
10 10 is formed with a generally planar depressed wall section 34 which merges with an upwardly
11 inclined peripheral section 36 joined along apex 37 to a downwardly extending outer rim flange or
12 skirt 38. The top of the cover, i.e., wall 34 and section 36 forms a dish-like shape for receiving the
13 bottom of a like container/lid combination in a nesting arrangement. The outer flange or skirt 38 is
14 interrupted by a pair of axel sections 40 which are spaced from the adjacent wall section 34 as is
15 illustrated in Figs. 1 and 5 to receive latching handles 48 to be described. The skirt 38 fits over the
16 upper edge of the container except for the axel portions. The cover 32 includes extended end
17 sections 42 which fit over the top of the container handles 26 in the assembled condition. The end
18 sections 42 define slightly depressed oblong sections 43 which overlie and accentuate the container
19 handles. See Fig. 13a.

20 The cover 32 further includes a downwardly extending inner sealing flange, rib or fin 44
21 positioned inwardly of the outer skirt 38. The rib or fin 44 has a base 44a joined to the bottom of
22 the wall section 34 and terminates in a free edge 44b. The sealing fin or at least the free edge thereof
23 has a slightly greater periphery than the periphery of the inside sealing surface 30b of the peripheral
24 wall of the container so that lower end of the fin 44 is deflected slightly inwardly by the inner sealing
25 surface 30b of the wall section 30 in the assembled condition. The slight deflection provides an
26 interference and sealing fit between the fin 44 and the inside surface 30b of the container peripheral
27 wall. See, for example, Fig. 13a. The sealing flange, the outer rim skirt and the inclined peripheral
28 section 36 of the cover form an inverted generally U-shaped cavity. Spaced vertical ribs 46 are
29 formed along the underside of the peripheral section 36 and extend between the inner sides of the

1 skirt 38 and the base of the sealing flange as shown in Figs. 2 and 2a to serve as stop members to
2 limit the downward movement of the cover and thereby control the extent or height of the seal
3 between the cover sealing fin and the container sealing surface. The stop member, when abutted
4 against the upper edge of the container, informs the user that a positive seal has been obtained.

5 In the embodiment just described the cover sealing flange or rib 44 is substantially vertical
6 and the inner sealing surface 30b on the upper peripheral wall of the container is slanted or canted
7 outwardly by the angle θ of say 2° to 5° degrees. In an alternative embodiment, to be described in
8 conjunction with Figures 14-28, the cover sealing flange or rib is canted outwardly in its unstressed
9 or unseated condition and the inner sealing surface of the container wall is generally vertically
10 inclined. With this arrangement as with the embodiment of Figs. 1-13, the lower portion of the cover
11 sealing rib is forced inwardly against the container sealing surface to provide the sealing action when
12 the cover is pressed downwardly over the mouth of the container.

13 Referring again to the embodiment of Figures 1-13 and more particularly to Figs. 8-10, the
14 cover or lid 32 is removably secured (and sealed) to the container 10 by means of a pair of oppositely
15 disposed latching handles 48 which engage the underside 50a of a pair of latch hooks 50 formed on
16 the outside of the peripheral upper edge of the container wall as is illustrated by the dashed lines in
17 Fig. 13. Each latch handle is formed with an upper surface 48a including an outwardly extending
18 finger engaging surface 48b, a back wall 48c and a lower surface. The lower surface is formed with
19 a pair of short protruding spaced inner walls 48d which together with the back wall form two
20 semicircular recesses 48e with downwardly faced openings 48f for receiving an associated axel 40.
21 The lower latch handle surface further forms a downwardly protruding locking tab 48g for engaging
22 the lower edge 50a of an associated locking hook 50 on the container wall. Additionally the lower
23 latch handle surface includes a finger engaging surface 48h.

24 The latch handles are assembled to the cover or lid 32 by spreading the inner walls 48 slightly
25 away from the back wall 48c (in a snapping action) to allow each axel to enter the respective recess
26 48e. The back wall 48c of each latch handle limits the rotational movement of the associated latch
27 handle to about 90° by engaging the edge 34a of the wall 34 when the upper surface of the handle
28 is about parallel to the surface 34. It should be noted that the edge 34a may include a small upward
29 curvature formed as part of the arched peripheral section 36.

1 As discussed previously and as illustrated in Figs. 13 and 13a, skirt 38, while fitting over the
2 upper edge of the container, except for the axel portions, does not extend under the upper peripheral
3 edge of the container wall. As a result, only the latch handles serve to lock the cover and container
4 together.

5 In use, the cover 32 with the latch handles assembled thereon, may be placed over the mouth
6 or top 24 of the container 10 and then pressed downwardly until the ribs 46 are seated on the
7 container's upper edge 22. In this position the inner sealing flange 44 forms an interference fit with
8 the inside of the container peripheral wall. The latch handles may then be easily rotated to a closed
9 position by pressing downwardly and inwardly on the finger engaging surfaces 48b until the locking
10 tabs 48g snap under the locking hooks 50.

11 The locked container and cover, with the contents stored therein, is now ready for storage.
12 To open the cover it is only necessary to rotate one or both of the latch handles to an unlocked
13 position and lift the cover. If desired, one latch handle (or both) may be rotated to its upper most
14 position and pressed upwardly (e.g., by a finger 52) while an area of the planar surface 34 of the
15 cover adjacent the handle is simultaneously pressed downwardly (e.g., by a thumb 54). This simple
16 maneuver causes the surface 34 to assume a slightly concave bow to break the seal and release the
17 cover from the container. See Fig. 12.

18 Another preferred embodiment of a storage container and lid is illustrated in Figs. 14-17.
19 This embodiment is very similar to the embodiment of Figures 1-13 except that the sealing rib on
20 the lid is canted outwardly and the inner sealing surface along the upper portion of the container
21 peripheral wall is about vertical. The container 110, like the container 10, includes a flat bottom wall
22 112 which merges at its periphery, through rounded corners 114, with a peripheral wall, comprising
23 end walls 116 and side walls 118. The end and side walls of the container 110 are merged through
24 rounded corners 120. The peripheral wall (116, 118) terminates in an upper edge 122. The edge 122
25 surrounds and defines an open top or mouth 125 of the container 110 and forms a pair of horizontally
26 protruding handles 126 above the end walls 116 as shown. The top surface of the handles are
27 substantially level with the plane of the edge 122 simplifying the manufacturing process and
28 allowing the cover to overlies the handles. The bottom wall 112 of the container projects downwardly
29 at the corners forming triangular shaped protruding feet 128.

1 The uppermost section of peripheral wall (116, 118) has a short transition or lead in wall
2 segment 123 extending below the upper edge 122 and above a surface 124a formed on the inside of
3 an upper section 124 of the peripheral wall as is best illustrated in Figures 17a, 24a, 25 and 27. The
4 surface 124a, which circumscribes the interior of the upper peripheral wall is referred to as the inside
5 sealing surface. The short lead in segment 123 is inclined outwardly at an angle λ to the vertical.
6 The angle λ and angle Φ (to be discussed) between the cover sealing rib or fin and the vertical must
7 be correlated to allow the lid to be seated on the container with a reasonable amount of force. The
8 angled lead in segment 123 and the inner surface 123a formed thereby facilitate the entry of an inner
9 sealing rib or fin 144 (described below) on the cover to enter the mouth of the container and form
10 a sealing fit with the generally rectangular sealing surface area 124a when a cover 132 is seated onto
11 the container. This angled transition wall segment 123 also facilitates removal of the cover. See
12 Figs. 24 and 25. The transition wall segment may be about 1/16 to 1/8 inches in height. The angle
13 λ should not exceed 45° and preferably is within the range of about 10° to 20° and most preferably
14 about 15°. The inside sealing surface 124a of wall section 124 is generally vertically disposed.
15 Reference numbers 127 and 129 (Fig. 17a) indicate the direction of vertical planes and horizontal
16 planes, respectively, in relation to the container bottom 122. The rest of wall 118 below the wall
17 section 124 may taper inwardly to the bottom 112, which facilitates nesting of two or more
18 containers.

19 Referring now to Figs. 14, 15 and 18-20, a replaceable cover or lid 132 for use with the
20 container 110 is formed with a generally planar depressed wall section 134 which merges with an
21 upwardly inclined peripheral section 136 joined along apex 137 to a downwardly extending outer
22 rim flange or skirt 138. The top of the cover, i.e., wall 134 and section 136 forms a dish-like shape
23 for receiving the bottom of a like container/lid combination in a nesting arrangement. The outer
24 flange or skirt 138 is interrupted by a pair of axel sections 140 which are spaced from the adjacent
25 wall section 134a as is illustrated in Figs. 14 and 18 to receive latching handles 148 to be described.
26 The skirt 138 fits over the upper edge of the container except for the axel portions and like the skirt
27 38 of the cover 32, does not extend under the upper peripheral edge of the container wall. The cover
28 132 includes extended end sections 142 which fit over the top of the container handles 126 in the
29 assembled condition. The end sections 142 define slightly depressed oblong sections 143 that

1 overlie and accentuate the container handles. See Fig. 14.

2 The cover 132 further includes a downwardly extending inner sealing flange, rib or fin 144
3 positioned inwardly of the outer skirt 138. The flange or fin 144 is canted or inclined outwardly
4 from the vertical through an angle Φ such that the free end 144a of the fin 144 is deflected or bent
5 inwardly by the container inside sealing surface 124a with the lower half portion 144b of the fin
6 being seated against the sealing surface 124a in the assembled condition. The cant or inclination
7 angle Φ (Fig. 26) may be as great as 20° but preferably is in the range of about 4° to 8° and most
8 preferably about 6°. The deflection of the fin 144 by the inside sealing surface 124a of the wall
9 section 124 provides a bending force and consequentially a lateral force there-between which
10 enhances a sealing or interference fit between the fin 144 and the inside surface 124a of the container
11 wall section 124. As will be noted the free edge 144a of the sealing fin 144 has a greater periphery
12 than the periphery of the container inside sealing surface 124a. See, for example, Fig. 24a.

13 It has been discovered that a length to height ratio for the fin 144 is preferably about 4.0 to
14 5.0 and most preferably about 4.5 for ease of manufacturing the rib integrally with the cover by
15 injection molding processes. A fin with a thickness of .055 inches at its base 144c would most
16 preferably be .25 inches in height. The fin or rib 144 has a draft, i.e., thinner at the free end than at
17 the base, of about 2° to 3°. The lower this height to width ratio the easier and more reliable the
18 manufacturing process. The selection of the fin cant angle Φ , the height of the fin and placement of
19 the fin on the cover in relation to the vertical sealing wall section 124 when the cover and container
20 are mated are preferably selected such that about one-half of the fin's lower surface area is pressed
21 into contact with the inner sealing surface 124a. The amount of flexure, i.e., bending of the sealing
22 fin 144, preferably should not exceed 20% to 30% of the maximum yield strength of the fin. The
23 vertical force required to seat the lid on the container may be of the order of 6 to 10 and preferably
24 about 8 ounces per linear inch to accommodate the strength of the anticipated users while providing
25 the desired seal.

26 Spaced vertical ribs 146 are formed along the underside of the peripheral section 136 and the
27 inner side of skirt 138 as shown in Fig. 15 and 18 to provide structural rigidity and seat on the upper
28 edge 122 of the container.

1 A pair of oppositely disposed latch handles 148 engage the underside 150a of a pair of latch
2 hooks 150 formed on the peripheral upper edge of the container wall. Each latch handle is formed
3 with an upper surface 148a including an outwardly extending finger engaging surface 148b, a back
4 wall 148c and a lower surface. The lower surface is formed with a pair of short protruding spaced
5 inner walls 148d which together with the back wall form two semicircular recesses 148e with
6 downwardly faced openings 148f for receiving an associated axel 140. The lower latch handle
7 surface further forms a downwardly protruding locking tab 148g with a bead 148i for engaging the
8 lower edge 150a of an associated locking hook 150 on the container wall. Additionally the lower
9 latch handle surface includes a finger engaging surface 148h.

10 The latch handles 148 are snapped onto the axels 140 and the cover 132 placed over the
11 mouth or top 125 of the container 110 with the fin inserted into the transition segment facilitating
12 the assembly process. See Fig. 24 and 25. The cover 132 is then pressed downwardly until the ribs
13 146 are seated on the container's upper edge 122. In this position the sealing fin 144 forms a seal
14 with the inside of the container. See Fig. 23a and 26. The latch handles 148 may then be easily
15 rotated to a closed position by pressing downwardly and inwardly on the finger engaging surfaces
16 148b until the locking tabs 148g is rotated to snap the bead 148i under the locking hooks 150 as
17 illustrated in Fig. 26.

18 Removal of the cover from the container may be accomplished similarly to the first above-
19 described embodiment as described and illustrated with reference to Fig. 12.

20 The container (10, 110) may be made (i.e., injection molded) of a suitable rigid or semi-rigid
21 plastic such as polypropylene, but is preferably made of polycarbonate which is suitable for
22 microwave and conventional dishwasher use. While the bottom of the container may be frosted the
23 sides are preferably transparent or translucent to enable the food or material stored in the container
24 to be readily viewed. It should be noted that to vent excess gas pressure from the container interior
25 (as a result of cooking) it is only necessary to unlatch one of the latch handles.

26 The cover or lid (32, 132) as well as the latch handles may also be made of a suitable plastic,
27 but are preferably made of polypropylene, having sufficient rigidity so that the inner flange of skirt
28 (44, 144) forms an interference or sealing fit with the inner surface of the container wall in the
29 assembled condition. The cover also preferably has sufficient beam strength and flexibility so that

1 when an upward force is exerted on the finger engaging lower surface (48h, 148h of one or both latch
2 handles (when in their upward most position) and a downward force is exerted on the planar top
3 cover surface adjacent the latch handle the outer rim flange (38, 138) will flex outwardly and
4 upwardly to break the seal and disengage the cover from the container. This feature adds to the user
5 friendliness of the container/lid arrangement and particularly for persons suffering from arthritis or
6 tendinitis of the hands an wrists.

7 The above-described storage container/cover arrangements can be made in a variety of sizes,
8 i.e., lengths, widths and depths (e.g., 12" x 7 ½" x 2" etc.), with or without a designed stacking
9 system. The container with the cover removed may be used as a serving dish.

10 There has thus been described improved, simple and inexpensive container/cover
11 combinations which provides a reliable sealing system for food stuffs. Various modifications of the
12 combination will occur to persons skilled in the art without involving any departure from the spirit
13 and scope of the invention as defined in the appended claims.